VIRGINIA STANDARDS OF LEARNING

Spring 2004 Released Test

END OF COURSE
Biology

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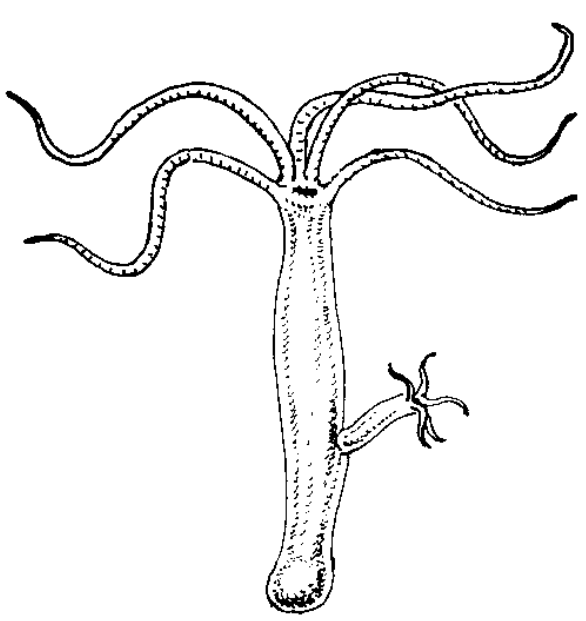
DIRECTIONS

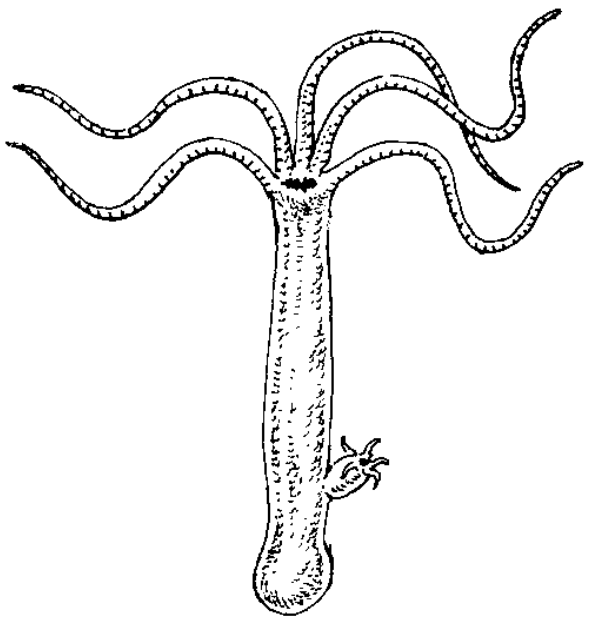
Read each question carefully and choose the best answer.

SAMPLE

The following pictures show some stages during asexual reproduction of a hydra. Which picture shows the first step?



F



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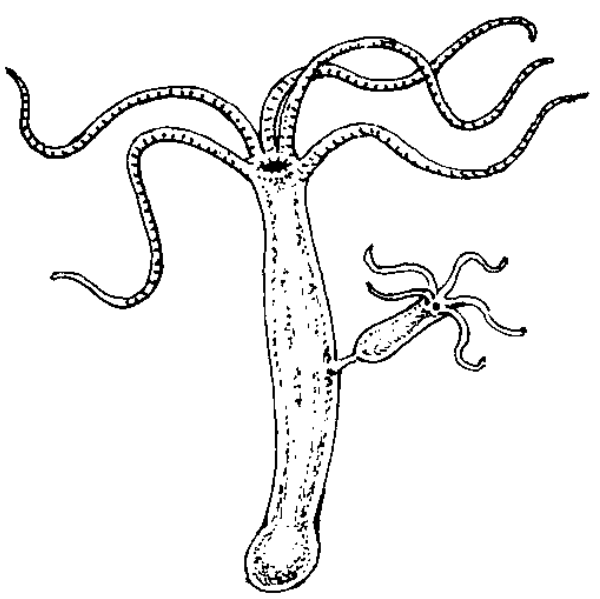

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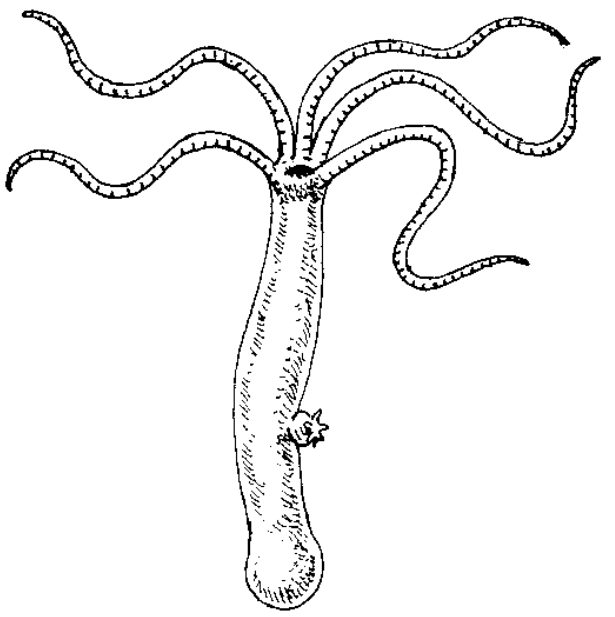


J

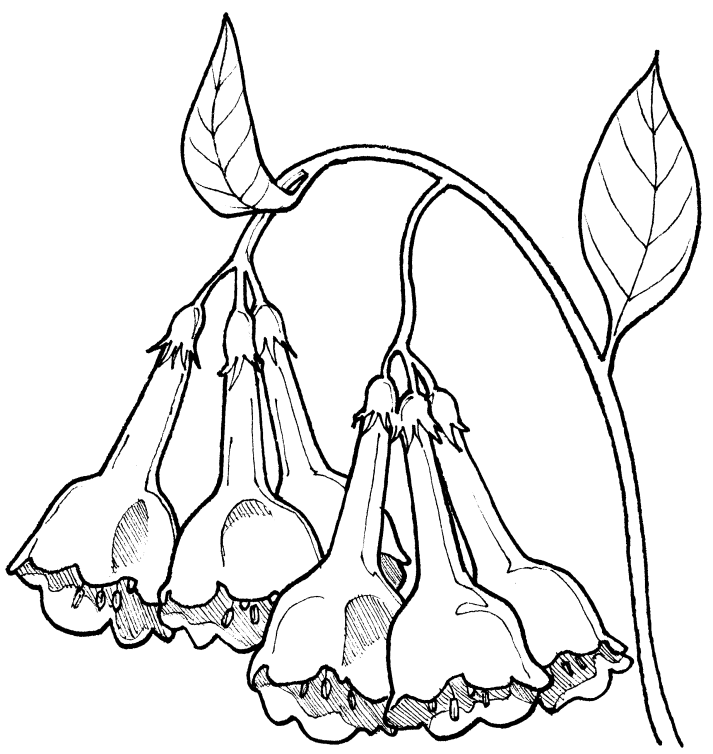
GO ON

Turn the page
and
continue working.

1

Key to Virginia Wildflowers

- Petals equal length
  - Flowers wide, upright
    - Viper's bugloss (Echium vulgare)
  - Flowers tubular, dangling
    - Virginia bluebell (Mertensia virginica)
- Lower petals longer
  - Lower lobe one piece
    - Lyre-leaved sage (Salvia lyrata)
  - Lower lobe divided into three pieces
    - Gray beardtongue (Penstemon canescens)



GO ON

This key can be used to identify the species of some wildflowers found in Virginia. All of the plants have blue or purple flowers with five petals that are fused together. According to this key, to what species does the plant shown belong?

A Viper's bugloss (Echium vulgare)
B Virginia bluebell (Mertensia virginica)
C Gray beardtongue (Penstemon canescens)
D Lyre-leaved sage (Salvia lyrata)

2 In which type of environment would a fossilized fish next to a fossilized leaf most likely live?

F Deep ocean trench
G A coral reef
H A freshwater lake
J Near an ocean vent

3 Which characteristic of prokaryotic organisms makes them different from eukaryotes?

A Prokaryotic cells do not have membrane-bound organelles.
B Prokaryotes do not have chromosomes.
C Prokaryotes are made of cells.
D Prokaryotes have DNA.

4 Which of the following methods would provide the most accurate information for students collecting data about local attitudes concerning the use of alternative fuels for automobiles?

F Take an opinion poll of drivers
G Listen to speeches given by politicians
H Study newspaper articles
J Track prices at nearby gas stations

GO ON

5 A bacterium will construct different proteins to metabolize the sugars lactose or glucose, depending on which one it detects in the outside environment. What part of the bacterium allows it to recognize different substances in the outside environment?

A Endoplasmic reticulum
B Cell membrane
C Nucleus
D Lysosomes

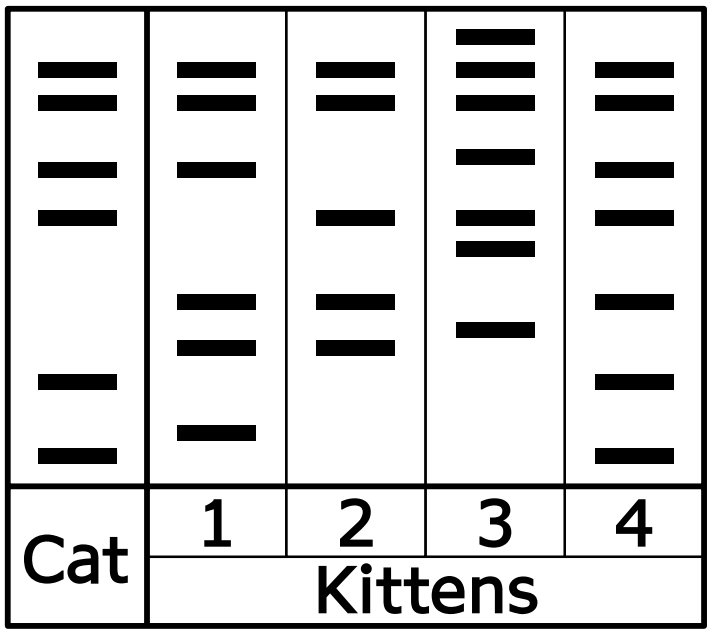
6 In order to maintain homeostasis, it is MOST important for an animal to be able to

F respond to its environment
G hide from its predators
H change its habitat
J increase its prey population

GO ON

7

DNA Fingerprints



The picture shows a segment of DNA from a cat. Which of these is most likely the kitten of this cat?

A 1

B 2

C 3

D 4

8 Organisms reproduce following several patterns. Some organisms produce few offspring and provide parental care. Other organisms produce many offspring but provide little or no parental care. Which of the following organisms has the greatest risk of losing a population due to the death of only a few individuals?

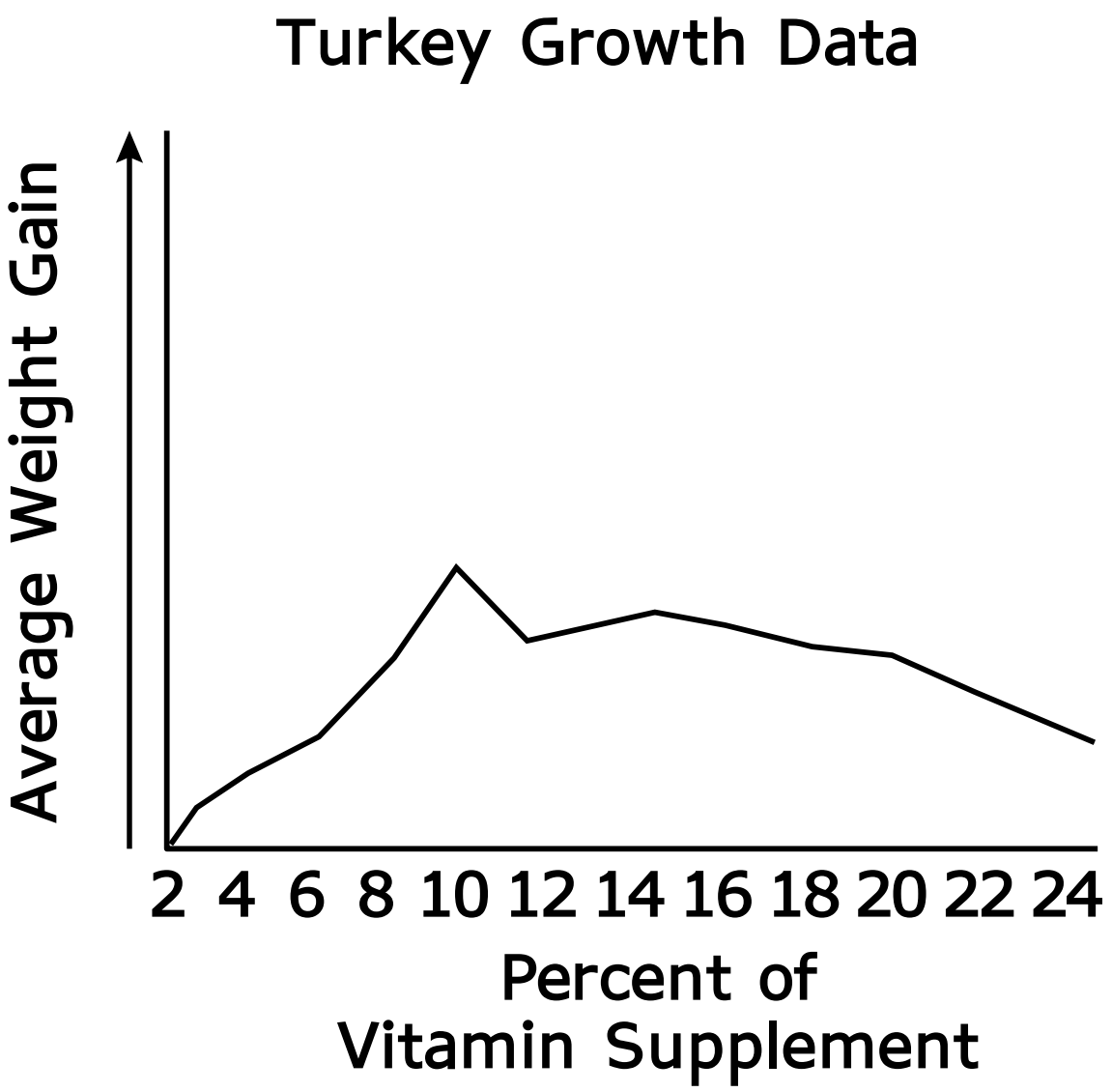
F Bacteria

G Flies

H Elephants

J Rats

9



A study on a poultry farm was conducted to determine the percentage of vitamin supplement necessary to add to the feed of turkeys in order to maximize their growth. According to this data, what percentage of vitamin supplement should be added to the turkeys' diet?

A 6%

B 8%

C 10%

D 14%

GO ON

10 What is the body's FIRST line of defense against disease?

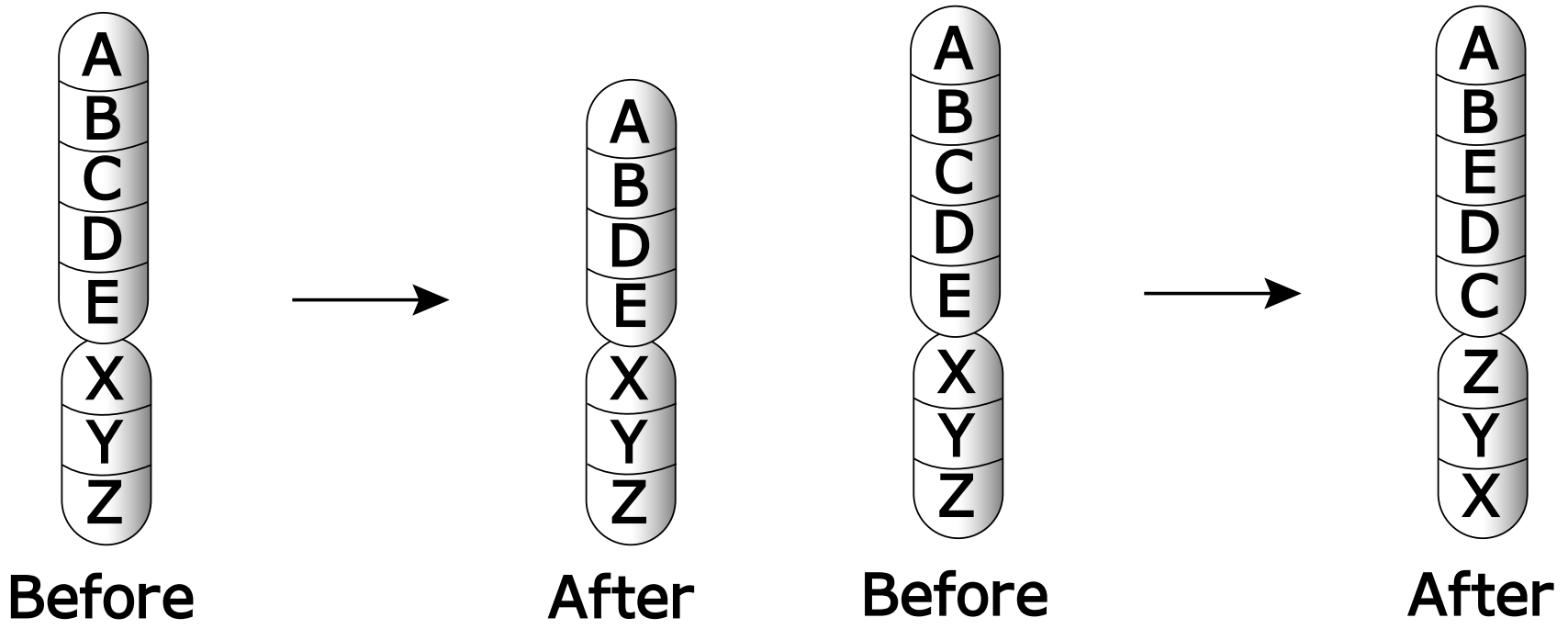
F Enzymes

G Blood

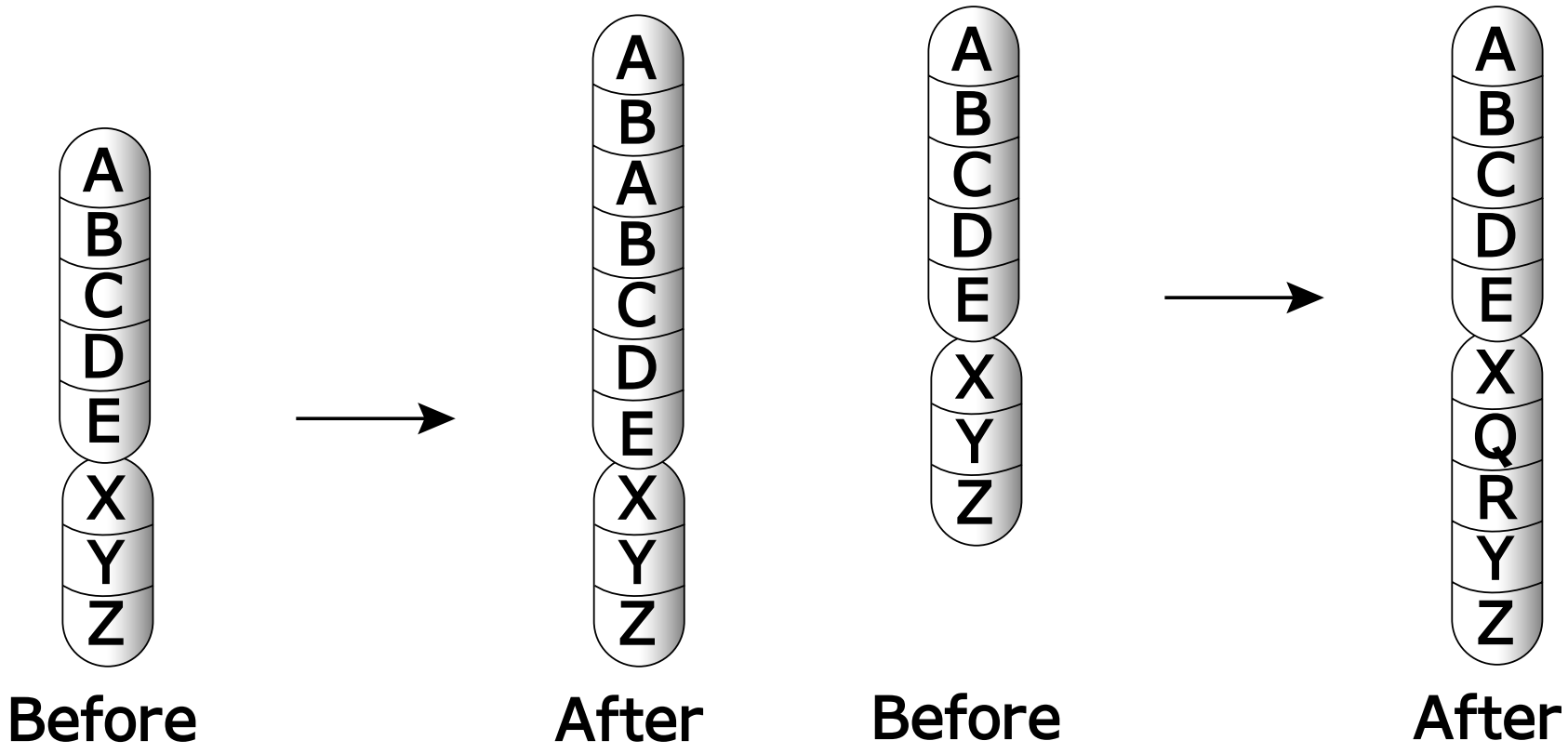
H Antibodies

J Skin

11 Inversions in chromosomes occur when part of a chromosome breaks out and is reinserted upside down. Which of the diagrams below represents an inversion?



A C

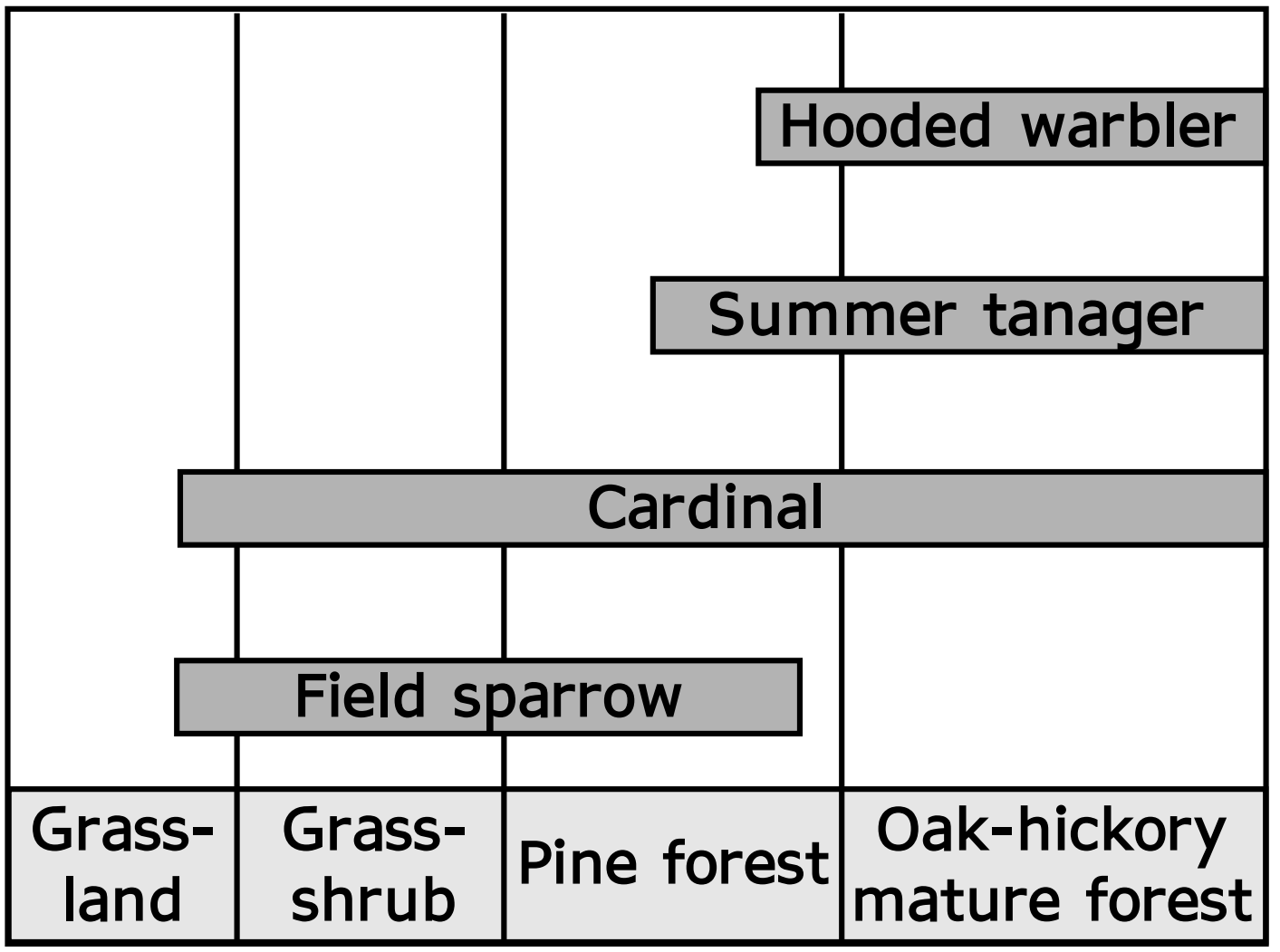


B D

GO ON

12

Use of Vegetation
By Bird Species



An experiment is designed to clear an oak-hickory forest and replant the area with pines. Which of the following species would be MOST threatened by this experiment?

F Field sparrow

G Cardinal

H Summer tanager

J Hooded warbler

GO ON

13 The processes of meiosis and fertilization help ensure the survival of the species by providing each generation with the same number of

A body cells
B chromosomes
C offspring
D gametes

14 Enzymes only work with specific substrates because each substrate

F has a specific activation site for enzyme attachment
G can only use a specific ionic bond with the enzyme
H destroys its specific enzyme
J actively interferes with other substrates around it

GO ON

15 Which of these is a common adaptation for mammals in an aquatic environment?

A Keen eyesight
B Streamlined body
C Sharp teeth
D Long fur

16 All of these are common shapes of bacteria EXCEPT

F rod
G spiral
H square
J spherical

GO ON

17 Average Water Loss (Transpiration) in Corn Plants (mL/hr)

Plot	May 15	May 30	June 15	July 1
1	1.2	3.4	6.4	10.7
2	1.1	3.1	11.9	9.8
3	1.2	3.5	5.5	10.1
4	1.1	3.8	6.2	9.5

In the above table, which item of data is most likely to be INVALID?

A Plot 1 on July 1

B Plot 2 on June 15

C Plot 3 on May 15

D Plot 4 on May 30

18 Based on the method by which they get food, organisms are classified as autotrophs or heterotrophs. Which organism listed below is correctly paired with its metabolism?

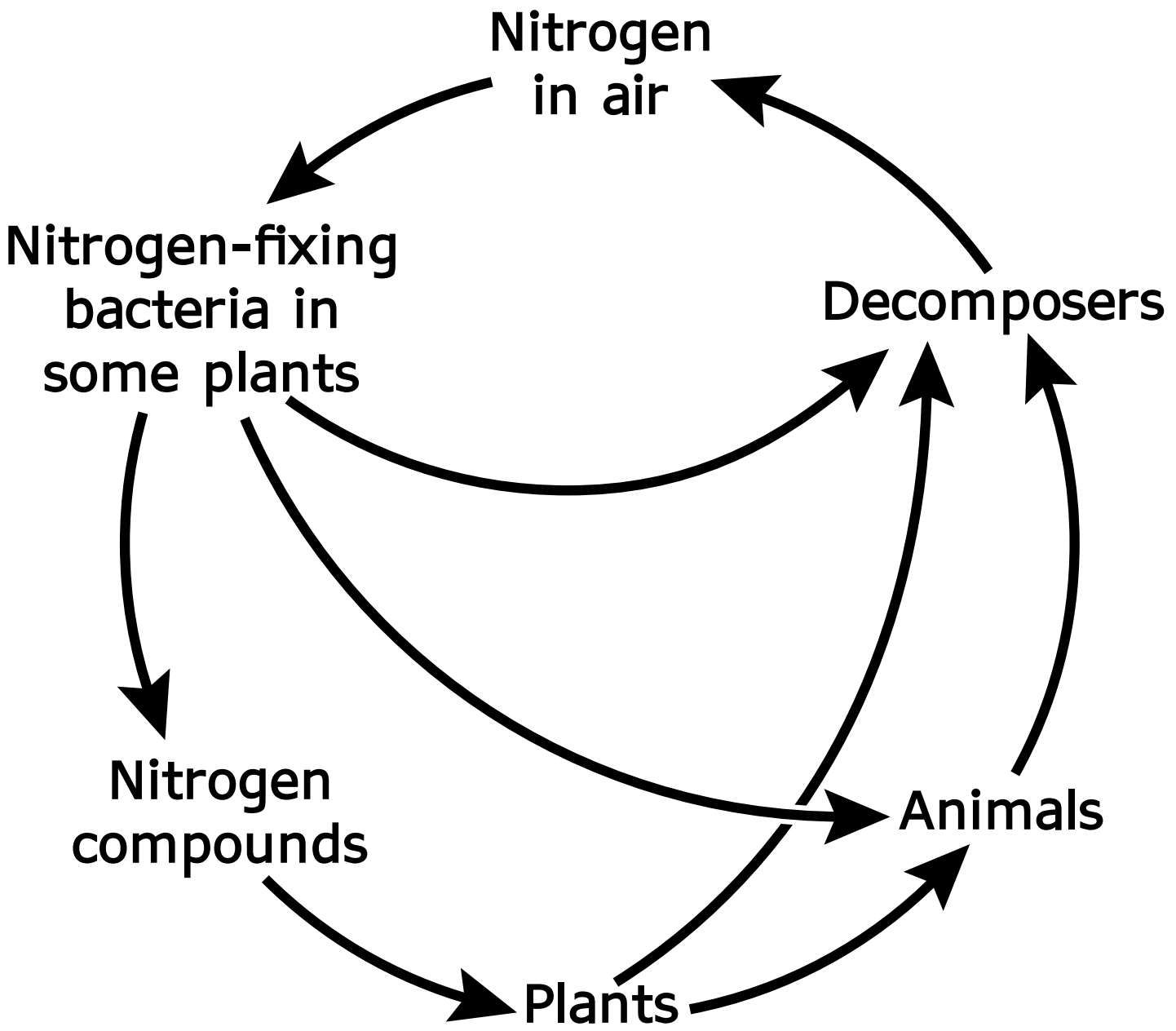
F Mushroom-autotroph
G Human-heterotroph
H Grass-heterotroph
J Fish-autotroph

19 In plants, gymnosperms have cones and angiosperms have flowers. Both of these plant structures are specialized for

A sexual reproduction
B food production
C water absorption
D photosynthesis

GO ON

20



The diagram shows a simplified nitrogen cycle. Which process is responsible for returning nitrogen to the air?

F Excretion

G Decomposition

H Photosynthesis

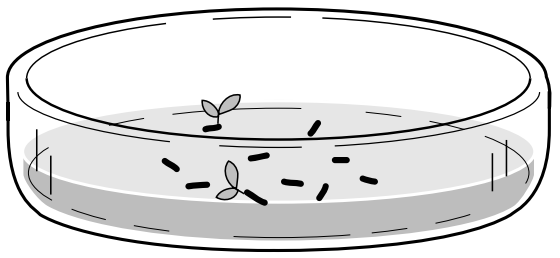
J Nitrification

GO ON

Turn the page
and
continue working.

21

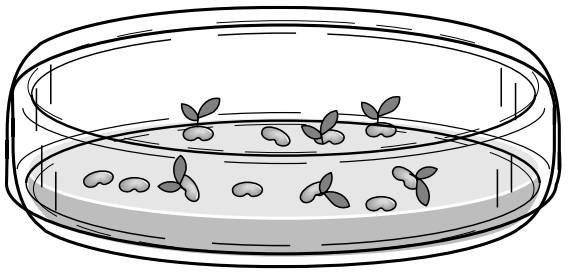
25°C



Group 1:

10 radish seeds
open Petri dish
20 mL motor oil

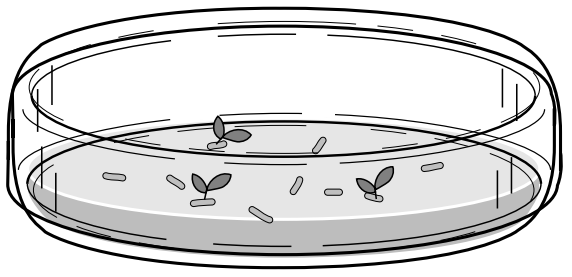
35°C



Group 2:

10 bean seeds
sealed Petri dish
20 mL dish soap

45°C



Group 3:

10 alfalfa seeds
sealed Petri dish
20 mL antifreeze

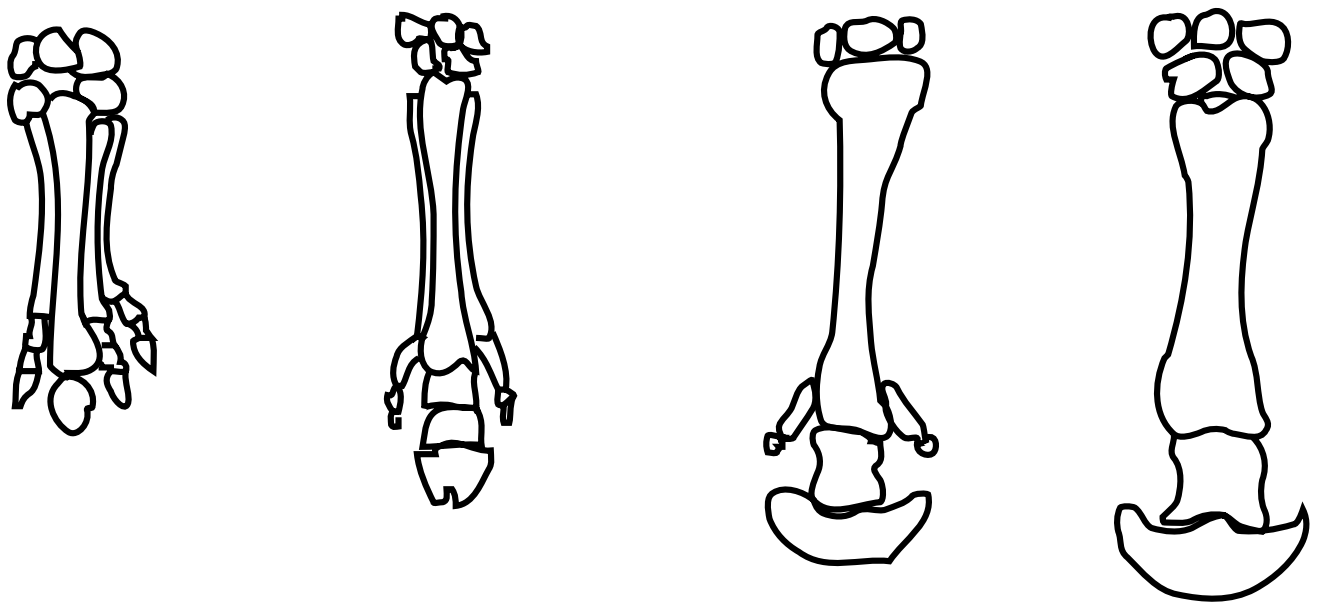
In the lab setup pictured above, a student is trying to determine the effect of pollutants on the growth of three groups of seeds. The results will not be valid because the experiment has no

A conclusion
B hypothesis
C control
D variable

GO ON

22

Fossil Records of Horse
Foot Structure Over Time



According to the diagram, during the last 40 million years, the structure of the horse's foot has

F lost its toes

G become smaller

H grown toes

J remained the same size

GO ON

23 Which of the following BEST explains why a student researching genetics should use the most recent textbooks available?

A Older textbooks are more difficult to understand.
B Research in Mendelian genetics began very recently.
C New discoveries frequently add to older knowledge in genetics.
D No technologies from more than ten years ago are still in use.

GO ON

Sandy Beach and Dune

Wildlife Locator Chart

	Feeds in Dunes	Feeds on Wet Sand or Beach	Feeds at High-tide mark
Nests in Tree Canopy or Shrubs	Yellow-billed Cuckoo American Robin Cedar Waxwing		Fish Crow Boat-tailed Grackle
Nests in Tree Trunks	Downy Woodpecker Northern Flicker		Raccoon
Nests on Ground	Eastern Cottontail	Black-bellied Plover Wilson's Plover Semipalmated Plover Piping Plover American Oystercatcher Willet Sanderling Semipalmated Sandpiper Dunlin Laughing Gull Ring-billed Gull Great Black-backed Gull	Ruddy Turnstone
Nests in Fresh Water	Fowler's Toad		

GO ON

A student studying wildlife nesting patterns in the sandy beach and dune ecosystem of the Chincoteague National Wildlife Refuge would find nests of the most species in which of the following locations?

F Shrubs

G Tree trunks

H Ground

J Fresh water

GO ON

25 Which of the following came first in the scientific study of living things?

A Light microscope
B Cell theory
C Electron microscope
D Model of DNA

GO ON

26 The unique properties of water enable life to exist on Earth. Which of these is a property of pure water?

F Its solid form is more dense than its liquid.
G It has a low heat absorption capacity.
H It is slightly more acidic than air.
J It dissolves many substances.

27 The populations of the lynx and snowshoe hare have remained relatively stable in relation to each other between the years of 1845 and 1940. If a predator of the lynx enters the food chain, you might expect the number of

A lynx and hares to become equal
B lynx to increase
C hares to increase
D hares and lynx to decrease

GO ON

28 The process of DNA replication is necessary before a cell

F makes a protein
G codes for RNA molecules
H divides into two cells
J modifies lysosome enzymes

29 Cowbirds often lay eggs in the nests of other songbirds. The young cowbirds grow up hearing the songs of their foster parents but sing cowbird songs when they are adults. This is an example of

A imprinting
B instinct
C mimicry
D camouflage

GO ON

30 According to the biological definition of a species, which organisms listed below would belong to the same species?

F Plants that have flowers with the same structures that attract the same pollinators

G Protists that are the same shape and have the same structures for movement

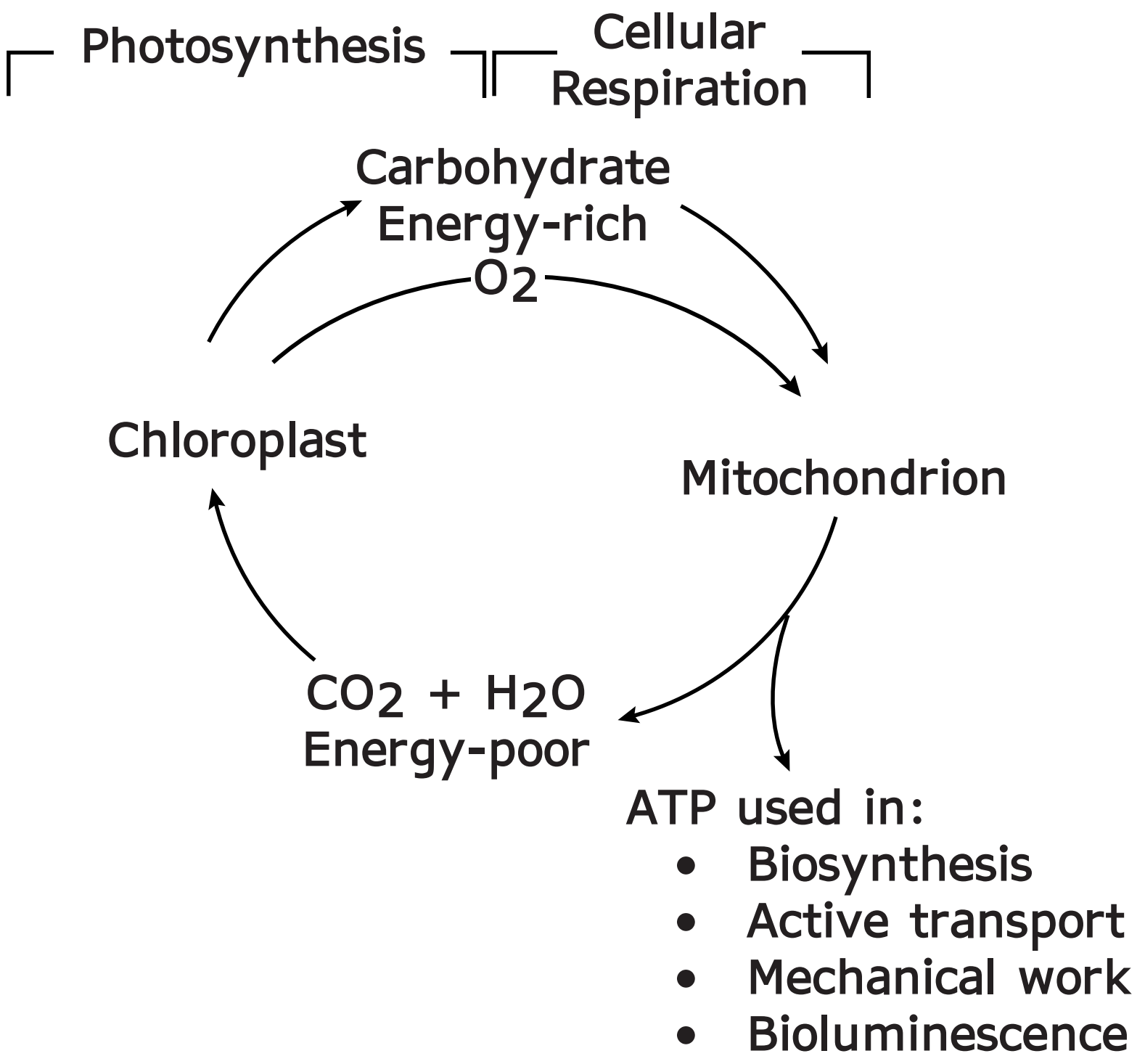
H Animals that can breed and produce fertile offspring

J Mushrooms that are the same color and can grow on trees

31 Orchids were studied to determine if the amount of humidity affected the flowering of these plants. Which of these was the independent variable in this study?

A The percentage of humidity
B The amount watered
C The length of time required for flowering
D The number of flowers on each plant

32 Sun



GO ON

Which statement is supported by the diagram?

F The mitochondrion uses the sun's energy directly.

G The end products of photosynthesis do not provide energy for cellular respiration.

H The main source of energy for photosynthesis is carbohydrates.

J Carbohydrates are converted into ATP by the mitochondrion.

33 An organism that causes infections in plants and animals, but cannot be seen with a light microscope similar to that used in a high school biology course, is MOST likely a

A virus

B bacterium

C fungus

D protozoan

34 Rabbit Test Cross Results

Parent Generation	Black × White
F_1	all black
F_2	75% black 25% white

What conclusion can be drawn from the genetic information above?

F The white parent carried a dominant allele.

G All the F_1 rabbits carried a recessive allele.

H All the white rabbits are heterozygous.

J All the black rabbits in the F_2 generation are homozygous.

GO ON

35 Which of the following scientific achievements BEST represents a collaborative effort among scientists?

A Anton van Leeuwenhoek invented the microscope in the 1600s, which was later used by others to study cells.

B Robert Koch studied infectious diseases, and Louis Pasteur demonstrated that life only comes from life.

C Gregor Mendel's study of pea plants enabled Thomas Morgan to become the first to locate a gene on a chromosome in DROSOPHILA.

D Francis Crick and James Watson worked together to design the double-helix model of DNA.

36 Richard was observing black swallowtail butterflies in the field. Which one of these is an observation he made about a black swallowtail butterfly?

F The black swallowtail is closely related to the spicebush swallowtail.

G The black swallowtail belongs to the class Insecta.

H The black swallowtail likes to fly more than anything else.

J The black swallowtail laid its eggs on a parsley plant.

37 A genetic pedigree showing that only males are affected by a certain disorder is evidence of what type of inheritance?

A Dominant
B Sex-linked
C Recessive
D Passive

38 Which of these could be successfully treated with antibiotics?

F Common cold
G Influenza
H HIV
J Strep throat

GO ON

39 One way to increase the number of organisms in an endangered species is to let the few remaining individuals of that species breed. However, this breeding may also lead to species extinction because inbreeding over a short period of time may

A reduce genetic diversity
B increase beneficial mutations
C produce a different species
D increase fertility

40 Proteins are formed from monomers (subunits) called

F amino acids
G fatty acids
H nucleic acids
J nucleotides

GO ON

41 Early classification systems consisted of two kingdoms; Plantae and Animalia. What scientific development allowed taxonomists to establish the Monera and Protista kingdoms?

A Discovery of DNA
B Creation of electrophoresis
C Invention of the electron microscope
D Development of Koch's postulates

42 One-celled eukaryotic organisms often found in freshwater ponds have what one characteristic in common?

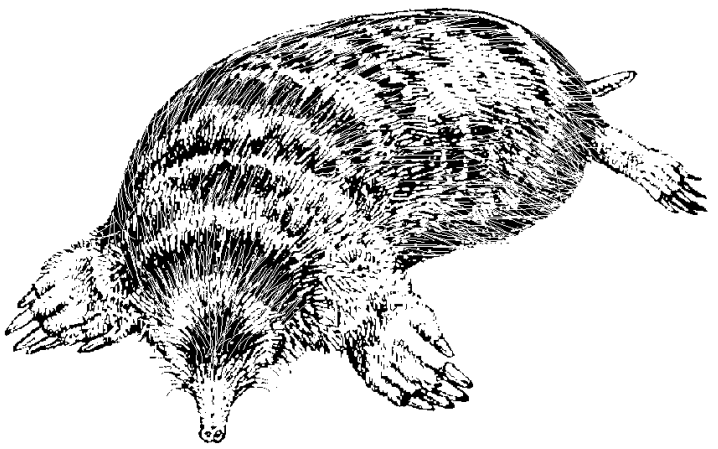
F Cilia
G Nucleus
H Pseudopodia
J Flagellum

GO ON

43 Some sphinx moth caterpillars are called tomato hornworms. These large caterpillars do a tremendous amount of damage to tomato plants. Which method of moth control would be most dangerous to the honeybee, which is needed for plant pollination?

A Using moth scents to attract moths to traps
B Releasing caterpillar parasites
C Spraying plants with insecticides
D Planting moth-repelling plants

44



Which characteristic supports the hypothesis that this animal spends a great deal of time burrowing through the soil?

F The shape of its body

G The position of its nose

H The length of its tail

J The size of its claws

GO ON

45 One theory of the extinction of dinosaur species is that a large meteorite impact on Earth caused a major atmospheric change marked by colder temperatures. If this theory is correct, what adaptation of mammals PROBABLY allowed them to survive even though dinosaurs became extinct?

A Superior low-light vision
B Consumption of an omnivorous diet
C Ability to bear live young
D Endothermic body metabolism

GO ON

Turn the page
and
continue working.

46

Number of Plant Seedlings	50	50	50	50
Water (mL/week)	50	50	50	50
Temperature at Which Plants Were Grown (°C)	19	20	21	22
Number of Daylight Hours	12	12	12	12
Relative Humidity	85	85	85	85
Average Number of New Leaves per Week	4	8	10	5

Which variable appears to control leaf production in these plants?

F The amount of water

G The temperature

H The number of daylight hours

J The relative humidity

Answer Key

Test Sequence	Correct Answer	Reporting Category	Reporting Category Description
1	B	003	Life at the Systems and Organisms Level
2	H	004	Interaction of Life Forms
3	A	002	Life at the Molecular and Cellular Level
4	F	001	Scientific Investigation
5	B	002	Life at the Molecular and Cellular Level
6	F	003	Life at the Systems and Organisms Level
7	D	002	Life at the Molecular and Cellular Level
8	H	004	Interaction of Life Forms
9	C	001	Scientific Investigation
10	J	003	Life at the Systems and Organisms Level
11	C	002	Life at the Molecular and Cellular Level
12	J	001	Scientific Investigation
13	B	002	Life at the Molecular and Cellular Level
14	F	002	Life at the Molecular and Cellular Level
15	B	003	Life at the Systems and Organisms Level
16	H	002	Life at the Molecular and Cellular Level
17	B	001	Scientific Investigation
18	G	003	Life at the Systems and Organisms Level
19	A	003	Life at the Systems and Organisms Level
20	G	004	Interaction of Life Forms
21	C	001	Scientific Investigation
22	F	004	Interaction of Life Forms
23	C	001	Scientific Investigation
24	H	004	Interaction of Life Forms
25	A	002	Life at the Molecular and Cellular Level
26	J	002	Life at the Molecular and Cellular Level
27	C	004	Interaction of Life Forms
28	H	002	Life at the Molecular and Cellular Level
29	B	003	Life at the Systems and Organisms Level
30	H	003	Life at the Systems and Organisms Level
31	A	001	Scientific Investigation
32	J	002	Life at the Molecular and Cellular Level
33	A	002	Life at the Molecular and Cellular Level
34	G	003	Life at the Systems and Organisms Level
35	D	001	Scientific Investigation
36	J	001	Scientific Investigation
37	B	003	Life at the Systems and Organisms Level
38	J	004	Interaction of Life Forms
39	A	004	Interaction of Life Forms
40	F	002	Life at the Molecular and Cellular Level
41	C	003	Life at the Systems and Organisms Level
42	G	002	Life at the Molecular and Cellular Level
43	C	004	Interaction of Life Forms
44	J	003	Life at the Systems and Organisms Level
45	D	004	Interaction of Life Forms
46	G	001	Scientific Investigation

1 2 3 4 5 6 7 8 9 10 11 12 A B C D E

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